(BSP September 25, 2002)

Welding Requirements for ASTM A 709 Grade HPS 70W Steel

All welding shall conform to the latest edition of the AASHTO Guide Specifications for Highway Bridge Fabrication with HPS 70W Steel.

Use of the ESAB ENi4 electrode in combination with Lincoln Mil800H flux will not be allowed.

Only submerged arc and shielded metal arc welding processes will be permitted. Consumable handling requirements shall be in accordance with AWS D1.5, Sections 12.6.5 and 12.6.6, except that SAW consumables shall meet the hydrogen control level of H4 as discussed in AWS D1.5, Section 12, Article 12.6.2. SMAW consumables shall meet either H4 or H8 except the higher preheat and interpass temperatures as noted in Table 3 of the AASHTO Guide Specifications for Highway Bridge Fabrication with HPS 70W Steel apply to H8 conditions.

Filler metals used to make single pass fillet welds for web to flange applications, and for attaching stiffeners and connection plates to webs and flanges, shall conform to AWS D1.5, Table 4.1 for ASTM A 709 Grade 50W base metal. Filler metals for single pass fillet welds need not meet the requirements for exposed bare applications.

Filler metals used for all complete penetration groove welds connecting Grade HPS 70W plate to ASTM A 709 Grade 50W plate may conform to the requirements for welding Grade 50W base metal, or may conform to the requirements for welding Grade HPS 70W base metal as listed below.

Filler metals used for all complete penetration groove welds connecting Grade HPS 70W plates shall conform to the requirements for HPS 70W base metal as follows:

Submerged Arc Welding process:

Wire	LA85 by Lincoln Electric Company
Flux	MIL800HPNi by Lincoln Electric Company

Shielded Metal Arc Welding process:

Matching	E9018MR*
Undermatching	E7018MR*

* the designator MR, for moisture resistant coating, is required for all SMAW electrodes used for welding HPS 70W steels.

The Contractor may request approval of alternative consumables in lieu of the above filler metals for SAW. The request for approval shall include documentation of successful welding in accordance with the AWS D1.5 Bridge Welding Code, and include diffusible hydrogen tests as described in AWS D1.5, Article 12.6.2 indicating the deposited weld metal under proposed fabrication shop conditions has a diffusible hydrogen level equivalent to H4 or less.

If specified in the Plans, additional weld procedure qualification tests shall measure the Charpy V-notch toughness of the coarse grained area of the heat affected zone (HAZ). The notch in the specimens shall be carefully located in the coarse grained area of the HAZ, as determined by macroetching the specimens prior to machining and testing. The toughness requirement for the HAZ shall be the same as the weld metal.

All procedure qualification tests shall be ultrasonically tested in accodance with AWS D1.5-96, Section 6, Part C. Evaluation shall conform to AWS D1.5-96, Table 9.1, Ultrasonic Acceptance - Rejection Criteria - Tensile Stress. Indications found at the interface of the backing bar may be disregarded, regardless of the defect rating.

The Engineer shall be allowed to witness all welding procedure specification qualification tests.

In general, post weld heat treatment shall not be required. The use of such post weld heat treatment shall require additional qualification testing.

Whenever magnetic particle testing is done, only the yoke technique will be allowed, as described in Section 6.7.6.2 of the AASHTO/ AWS D1.5 Bridge Welding Code, modified to test using alternating current only. The prod technique will not be allowed.